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Application No. 09/890,695
Filed: August 3, 2001
TC Art Unit: 1754
Confirmation No.: 6216

REMARKS

Claims 1-16 are pending in the present application. Accordingly, claims 1-16 will be pending upon entry of the instant amendments.

Any amendments to the claims should in no way be construed as acquiescence to any of the Examiner's rejections and were done solely to expedite the prosecution of the application. Applicant reserves the right to pursue the claims as originally filed in this or a separate application(s).

Applicants respectfully traverse the Examiner's assertion that, in the previous response, the cited references were attacked individually. To the contrary, the remarks in the previous response are clearly presented in the form of identifying the deficiencies of the primary references, followed by pointing out that the relied upon secondary reference fails to cure those deficiencies, such that the rejection, in combination of those references, fails to establish obviousness.

Claim Rejections - 35 U.S.C. §103

Claims 1-6, 9-13 and 15 are rejected under 35 U.S.C. §103(a) as being obvious over Nishino et al. (U.S. Patent 4,409,125) taken with Abbott (U.S. Patent 3,053,775) and further in view of Simpson (U.S. Patent 4,274,979).

The Examiner asserts that while Nishino et al. teaches a method of the continuous carbonization and activation of the cellulosic fibers, it does not teach that the process occurs by continuously traveling the fiber through stages of a carbonization chamber nor does it explicitly teach that the cellulosic fiber is

WEINGARTEN, SCHURGIN,
GAGNEBIN & LEBOVICI LLP
TEL. (617) 542-2290
FAX. (617) 451-0313

a cellulosic fiber fabric. The Examiner relies on Abbot for teaching continuous travel of fiber through successive stages of carbonization and relies on Simpson for teaching cellulosic cloth.

Applicants respectfully traverse the foregoing rejection.

In claim 1, the process according to the invention is the carbonization of a cellulose fiber fabric by passing the fabric continuously through a carbonization chamber and retrieving the resulting carbon fiber fabric after carbonization of the cellulose fiber fabric. As the fabric travels continuously through the carbonization chamber, it undergoes consecutive heat treatments at three different conditions. In the first stage, the fabric enters through the carbonization chamber at a temperature in the range of 250°C to 350°C, at a mean speed lying in the range of 10°C/min to 60°C/min. In the second stage, the fabric undergoes a temperature exposure in the range of 350°C to 500°C at a mean speed in the range of 2°C to 10°C. In the third stage, the fabric undergoes a heat treatment in the range of 500°C to 750°C at a mean speed in the range of 5°C/min to 40°C/min. With the particular combination of temperature and speed, the optimal characteristics of the fabric are produced. The selection of the temperature profile of the present invention makes it possible to obtain a carbon fabric free of substantial deformation and with retention of good mechanical properties. Furthermore, the continuous process of the present invention results in a reduced duration for the whole carbonization process as compared with the prior art batch methods.

The arguments presented in Applicants' previous response with respect to Nishino et al. and Simpson are reiterated herein. As previously argued in the prior response filed May 15, 2003, in

WEINCARTEN, SCHURGIN,
GAGNEBIN & LEBOVICI LLP
TEL. (617) 542-2290
FAX. (617) 451-0313

contrast to the present invention, the carbonization process of Nishino et al. includes the imposition of heat at a higher temperature and at a faster rate. Nishino et al. practices a batch process where a single temperature is used. While Nishino et al. describes a range of heating rate from 5°C/min to 15°C/min, preferably 10°C/min to 45°C/min, and while heating rates of 15°C/min and 30°C/min are provided in the examples (column 4, lines 4 and 35), Nishino et al. fails to teach or suggest the factors involved for obtaining efficient carbon fiber fabric using a continuous process within a carbonization chamber and in the multiple heating stages in accordance with the invention. Nishino et al. focuses on batch processing, which is distinctive from the present invention, and no requisite motivation is proffered to make the claimed invention. As a primary reference, Nishino et al. fails to teach or suggest the claimed invention.

With respect to Abbott, the Examiner specifically states that, "Abbott teaches a process for the carbonization of cellulosic fibers whereby continuously traveling the fiber through successive stages of a carbonization chamber is preferred to a batch-wise process." However, Abbott, either alone or in combination with Nishino et al., fails to teach or suggest all the steps of the method of the claimed invention. The Examiner makes no specific reference in the Abbott patent that would be indicative of showing a *prima facie* case of obviousness. Abbott discloses in column 2, lines 40-43, that continuous filaments or yarns are preferred because they can be continuously treated. Abbott is absolutely silent with respect to the method actually carried out. A tunnel furnace including a carbonizing section is mentioned, but there is certainly no disclosure therein concerning

WEINGARTEN, SCHURGIN,
GAGNEBIN & LEBOVICI LLP
TEL. (617) 542-2290
FAX. (617) 451-0313

traveling the fiber through "successive stages of a carbonization chamber" as asserted by the Examiner. In fact, no description of the process in the carbonization section is provided such that the Examiner's interpretation of Abbott is questionable. Moreover, the examples provided in Abbott all concern batch processing (see, for example, column 2, lines 56-58, and column 4, lines 29-30, for Examples 2-4). The combination of the teachings of Nishino et al. and Abbott still fails to teach or suggest the multistage heat treatment as recited in claim 1. Again, no requisite motivation is proffered and there is no reasonable expectation of success using the teachings of both Nishino et al. and/or Abbott.

Simpson fails to cure the deficiencies found in both Nishino et al. and Abbott. As argued previously, Simpson fails to disclose the particular combination of desirable temperatures and rates as claimed to obtain the resulting characteristics of Applicants' fabric. Despite any teaching of carbonizing cellulosic fibrous material, the resulting process used in Simpson would provide carbon fibers being brittle (column 5, lines 53-37). In addition, Simpson's use of the drying step would not provide a sufficient teaching to use this particular step with the process in Nishino et al. or Abbott to come up with the present invention. Simpson's requirements are outside the temperature and heating rates of the present invention, and Nishino et al. and Abbott lack any teaching or suggestion with respect to the combined multiple heating rates in accordance with carbonization process steps of the invention.

Furthermore, none of the cited references, either alone or in combination, teaches or suggests a carbonization chamber having successive individually controlled temperature zones (claim 2), a

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FAX (617) 451-0313

transit time through the carbonization chamber of between 20 minutes to 2 hours (claims 3 and 10) (the Examiner relies on Nishino et al., which only discloses a batch process and, thus, necessarily, does not disclose a transit time), and an activation treatment after carbonization (claims 9 and 16, about which the Examiner is silent).

It is not enough for the Examiner to simply assert that one of ordinary skill in the art would have found it obvious to use the teachings of Abbott in place of the original teachings of Nishino et al. It is settled law that the Examiner cannot arbitrarily change the principle of operation of a reference in order to establish obviousness (*see*, for example, MPEP §2143.01, *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)). A "substantial reconstruction and redesign" of the primary reference would have been required in view of the Examiner's proposed combination. Based on the foregoing, either alone or in combination, Nishino et al. taken with Abbott and in view of Simpson fail to teach or suggest the claimed invention. Accordingly, Applicants deem the claims are allowable and respectfully request withdrawal of the rejection.

Claims 7-8, 14 and 16 are rejected under 35 U.S.C. §103(a) as being unpatentable over Nishino et al. taken with Abbott and in view of Simpson, as applied to claims 1-6 and 9-13 above, and further in view of Perkins (GB 1,136,349).

Applicants respectfully traverse the foregoing rejection. Arguments against obviousness with respect to Nishino et al., Abbott and Simpson are presented above and reiterated herein for

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claims 7-8, 14 and 16, which are dependent of the independent claims defended above.

Perkins fails to add any teaching or suggestion that would overcome the deficiencies of the combined art cited above. The Examiner asserts that "[i]t would have been obvious to one of ordinary skill at the time of the invention to perform the graphitization treatment of Perkins on the carbon fiber produced by Nishino et al. and Simpson, in order to produce a graphite product." Applicants maintain that no suggestion or motivation has been proffered, either in the references or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. It seems that the Examiner's reliance on Perkins is in hindsight to perform graphitization in order to obtain a graphite product, which cannot be applied as an obvious teaching. Applicants deem that claim 1 remains patentable despite the addition of Perkins, and claims 7, 8, 14 and 16 are patentable at least by their dependence from claim 1.

WEINGARTEN, SCHURGIN,
GAGNEBIN & LEBOVICI LLP
TEL. (617) 542-2290

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CONCLUSION

Based on the foregoing, entry of the amendments and remarks presented herein, reconsideration and withdrawal of all the rejections and allowance of application with all pending claims are respectfully requested.

The Examiner is encouraged to telephone the undersigned attorney to discuss any matter that would expedite allowance of the present application.

Respectfully submitted,

PIERRE OLRY ET AL.

By: Holliday C. Heine

Holliday C. Heine, Ph.D.
Registration No. 34,346
Attorney for Applicant(s)

WEINGARTEN, SCHURGIN,
GAGNEBIN & LEBOVICI LLP
Ten Post Office Square
Boston, MA 02109
Telephone: (617) 542-2290
Telecopier: (617) 451-0313

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